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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/730,100	12/05/2000	Paul S. Nolan	6121	7486

29394 7590 07/17/2002

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EXAMINER
NAVE, EILEEN ENAD

ART UNIT	PAPER NUMBER
1754	5

DATE MAILED: 07/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MFN

Office Action Summary	Application No. 09/730,100	Applicant(s) NOLAN ET AL
	Examiner Eileen E. Nave	Art Unit 1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/5/00-2/19/01* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 U.S.C. § 112

1.The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(A) Claim 1, line 5 recites an improper Markush group. Examiner suggests -- at least one selected from the group consisting of chlorine and aqueous chlorine species. --

(B) Claim 3, lines 2 &3 recite an improper Markush group. Examiner suggests -- at least one selected from the group consisting of hydrogen sulfide gas and an aqueous sulfide species. --

(C) Claim 5, lines 2 &3 recite an improper Markush group. Examiner suggests -- at least one selected from the group consisting of hydrogen sulfide gas and an aqueous sulfide species. --

(D) Claim 8, line 1 recites an improper Markush group. Examiner suggests changing "at least one of:" to -- at least one selected from the group consisting of --.

Claim Rejections - 35 U.S.C. § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 99/58228.

WO 99/58228 discloses a process for oxidizing gaseous pollutants in a flue gas stream composed of flue gases, water vapor and mercury vapor comprising (a) injecting sufficient chlorine in a gaseous form, a liquid form or as a water solution into the flue gas stream while the flue gas stream is at a temperature greater than 100 OC to thereby react the chlorine with the pollutants and permitting the flue gas stream/chlorine mixture to react for a sufficient time to enable a significant amount of the pollutants to occur, whereby an oxidized glue gas stream comprising gases, water vapor and oxidized mercury (mercuric chloride) is formed (page 6, lines 13-15); (b) scrubbing the oxidized flue gas stream with water or water solution and (c) adding sufficient alkali metal halogen salt to precipitate the mercury from the water or water solution as the concentration level requires (claim 1).

Claim Rejections - 35 U.S.C. § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deer Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 4, 11, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/58228.

The prior art rejection of WO 99/58228 above is applied herein.

WO 99/58228 does not specifically disclose that the temperature of the flue gas is between 125 ^{o}C and 200 ^{o}C. However, it would have been obvious to one of ordinary skill in the art at

the time the invention was made to use a flue gas temperature of in the process of WO 88/58228 because WO 99/58228 teaches using a flue gas stream is at a temperature greater than 100 °C (claim 1), which 125 °C and 200 °C fall in that range; thus, one of ordinary skill in the art could determine such temperatures greater than 100 °C, ~~in view of~~ absent unexpected results.

WO 99/58228 does not specifically disclose substantially all of the elemental mercury is converted to oxidized mercury. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to convert substantially all of the elemental mercury to oxidized mercury in the process of WO 88/58228 because WO 99/58228 teaches that the chlorine and the mercury are reacted for a sufficient time to enable a significant amount of oxidation of the mercury to occur (claim 1); thus, one of ordinary skill in the art could optimize the process in order to form a desired amount of product (e.g., convert substantially all of the elemental mercury to oxidized mercury) in view of unexpected results.

9. Claims 5, 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/58228, as applied to claim 1 above, and further in view of Downs et al (US 6,284,199 B1).

The prior art rejection of WO 99/58228 above is applied herein.

WO 99/58228 does not disclose that the removing oxidized mercury step comprises treating the flue gas with hydrogen sulfide gas and/or an aqueous sulfide species. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further treat the flue gas with hydrogen sulfide gas and/or an aqueous sulfide species after the chlorine treatment step of WO 99/58228 because Downs et al teaches supplying a source of

sulfide, such as hydrogen sulfide and/or aqueous potassium or sodium sulfide (col. 3, ln. 6-10), and in order to react oxidized mercury with the source of sulfide in order to form an insoluble mercuric sulfide (col. 2, ln. 18-30) and also to prevent the reduction of mercury back to vaporous elemental mercury (col. 2, ln. 41-44). It would have also been obvious to one of ordinary skill in the art at the time the invention was made to substitute the halogen salt precipitation step of WO 99/58228 with the sulfide precipitation step of Downs et al because it is prima facie obvious substitute equivalents known for the same purpose.

10. Claims 2, 3, 7-9, 13 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/58228 or WO 99/58228 in view of Downs et al, as applied to claim 1 or 5 above, respectively, and further in view of Zhao et al, Mercury Absorption in Aqueous Hypochlorite.

The prior art rejection of WO 99/58228 above is applied herein. The prior art rejection of WO 99/58228 in view of Downs et al above is applied herein.

Neither WO 99/58228 alone or Downs et al disclose that the aqueous chlorine species comprises an oxi-acid, such as those recited in instant claim 8, or a salt of an oxi-acid. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an oxi-acid, such as those recited in instant claim 8, or a salt of an oxi-acid as the chlorine material in the process of WO 99/58228 or WO 99/58228 in view of Downs et al because Zhao et al teaches that the capability of hypochlorite to dissolve mercury has long been recognized to dissolve mercury by using sodium or potassium hypochlorite and hypochlorous acid and that

aqueous hypochlorite, such as NaOCl is also effective in absorbing elemental Hg vapor even at high pH (see first page).

Conclusion

11. No claims are allowed.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eileen E. Nave whose telephone number is (703) 305-0033.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (703) 308-3837.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9671 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

EEN
Nave/een

July 14, 2002

STUART L. HENDRICKSON
PRIMARY EXAMINER